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Dear Cooperator:

Eastern Lyman County Organizes New Soil Conservation District

The American Creek Soil Conservation District in Lyman County has been organized and is now waiting for approval from Washington before beginning operations.

This district comprises 180,375 acres in eastern Lyman County, and is bordered on the east by the Missouri River and on the south by the White River.

A hearing on creation of this conservation area was held at Reliance, on November 23. The State Committee attended. It met after the hearing and determined that there was sufficient reason to permit the group to continue with the organization plans. The referendum was held on December 29, and the State Committee met two days later to canvass the ballots and to approve the district. The results of the referendum were:

Number voting for district	215
Number voting against district	29
Total votes cast	244

The ballots cast represented 144,164 acres, or 79.92 percent of the entire area.

Fred Pilker of Oacoma, and Fred Nissen of Reliance were selected by the State Committee as two of the supervisors. The other three --- Arthur Eymar of Reliance, George C. MacManus of Lyman, and Horace Wagner of Reliance -- were elected by the residents of the area on January 18 at the Town Hall in Reliance. Fred Nissen was chosen by this group as Chairman, Fred Pilker as Vice Chairman and R. L. Miller, the County Agent, was chosen as Secretary.

A program of work which included basic data and factual information on the area was prepared by this group in co-operation with county assistance. A plan of work that suggested the types and amounts of work to be attempted was drawn up also. These two documents were sent to Washington, along with a Memorandum of Understanding, for approval of the Secretary of Agriculture.

The action program in this soil conservation district will begin as soon as

the approval of the Secretary is obtained. The types of work to be undertaken will include: Water spreading, irrigation, contour farming, range improvement, grass seeding, forestation, dam construction, and the development of wildlife refuges. Special attention will be given to the utilization of waste water from artesian wells by using it for spreading on hayland or on small areas in cultivated fields.

The District Supervisors also have signed memoranda of understanding asking for the loan of Soil Conservation Service equipment, the grant of planting materials, and the use of CCC labor. It is not known at this time just how much of this type of assistance will be made available. It is the wish of the Supervisors that the agreements all will be approved in time to permit work to begin early in the spring.

This is the fifth soil conservation district in South Dakota--or nearly one million acres of land in this state are within the boundaries of such organized legal subdivisions.

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Soil Conservation Service Takes Over Land Utilization Program; 2,023,500 Acres Affected in So. Dak.

Important to the progress of better land use development in South Dakota was the placement of the Land Utilization Program under Soil Conservation Service direction in the U. S. Department of Agriculture reorganization late in 1938.

This step was designed to bring about closer coordinated direction of federal agricultural activities in this and other states having to do with such problems as erosion control, moisture conservation, and sound land use. The Land Utilization program was transferred from the Bureau of Agricultural Economics, that had administered the program since 1937.

A total of around 2,023,500 acres is included within the boundaries of the so-called LU projects in South Dakota. Only a part of this acreage, however, is designated for government purchase. The acquisition is limited to types and amounts of sub-marginal land necessary to bring about the desired adjustment in occupancy pattern and consequent agricultural use. The adjustments so affected contemplate permanent management for maximum productive use consistent with approved conservation practices.

The largest South Dakota LU project is the Bad Lands-Fall River Project, comprising approximately 1,300,000 acres in Jackson, Pennington, Custer and Fall River Counties. In this area, with headquarters at Rapid City, upwards of 500,000 acres of land have been acquired or optioned.

A relatively new area is the Perkins-Corson Project of approximately 495,000 acres in these two counties. Eventual acquisition in this area is expected to total about 200,000 acres. The project office is at Lemmon.

The Lemmon office also administers, through a sub-office at Pierre, the old South Central South Dakota Project of approximately 210,000 acres in Lyman, Hughes, Buffalo, and Jones counties, of which around 105,000 acres have been obligated by the Government.

Two small wildlife development projects likewise are administered through the Lemmon office. They are the Little Moreau area of 3,155 acres in Dewey county, and the Fort Sully Project covering approximately 15,500 acres in Sully county, of which about 14,400 acres have been obligated.

The major LU projects in this northern Great Plains region are in areas where there is sub-marginal crop land that should be returned to grazing which has been found to provide the best perman-

ent land use. To this end, generally, the first step is the planning of the proper operating units for the area, with option and purchase of that land needed to effect the readjustment of the land pattern and the number of operators. Necessary land use improvements then are made, including such measures as stock water development, seeding formerly cultivated land to grass, removal of unneeded fences and buildings, and construction of new fences. Finally, a long-time sound conservation management plan is developed, under government supervision but with a maximum amount of local cooperation and direction, such as that arranged through the leasing of the developed lands through state grazing associations to operators remaining in the area who can use them to best advantage.

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CCC Camp at American Island Organized To Aid District Supervisors in Work

The Brule - Buffalo Soil Conservation District is the only one in the State that has been organized to date where the services of a CCC Camp are made available to the District Supervisors.

The CCC Camp at American Island, Camp SCS-7, which has been headquartered there since October 15, 1938, after working in the Crow Creek and Presho areas, cooperates with the District Supervisors in carrying out the plan of work established for the area. The technicians assigned to this camp also are made available to the District Supervisors, and they assist in working out the land use and conservation agreements.

The soil erosion control-moisture conservation program is well accepted in this area, and the people residing within the District boundaries realize that there is a problem of proper land use. The Supervisors, however, have found a few problems that need to be met before the District will be able to

operate at maximum efficiency. They include the need of obtaining long-time leases which will permit the construction of adequate conservation structures, obtaining leases on a carrying capacity basis on range land, and establishing units of sufficient size and continuity to accomodate the live-stock that should be on the unit.

Thirty-one applications for agreements have been received, and eleven of them have been completed. A dozen additional agreements are awaiting signatures.

One hundred and fifty acres of land was leased by the Supervisors and planted to grass in the fall of 1938. The seed will be used to supply additional cooperators with grass seed in the future.

In addition to the contour cultivation, controlled grazing, strip cropping, water spreading and dam construction which have gone to make up the program, the CCC labor has removed 3,073 rods of fence, leveled 2,132 rods of fence row drifts, and rebuilt 2,073 rods of fence in the District.

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Soil Sagacity

New, interesting and unusual phrases and statements on the subject of Soil Conservation taken from "To Hold This Soil", by Russell Lord:

"Manhandled Land-Fertile soil goes off by carload lots."

"Trees to the settler were weeds and enemies to be fought with axe and fire."

"Instead of imposing themselves on the landscape in stiff checkerboard fashion these***strip fields have fitted themselves at last to the lay of the land."

"Strip crops and terraces hold these slopes like guarding arms."

"As a garment cut to measure, crop strips clothe and protect these ** slopes."

Brown-Marshall District Shows Progress
In Erosion Control And Moisture Con-
servation

Marked progress in the surveying and planning for soil erosion control and moisture conservation farm operations in the Brown-Marshall Soil Conservation District is reflected in figures for the first eight and one-half months of activity.

Five surveys have been made and are being used by the Supervisors in setting up farm plans for the cooperators. The surveys are:

Reconnaissance erosion
Economic (with 70 farmers
cooperating)
Land ownership
Vegetative
Aerial mapping

The following table gives the progress of applications and planning from April 1, 1938 to February 1, 1939:

Number of Farmers in District - - - - -	370
Number of applications received - - - - -	222
Signed approved agreements- - - - -	66
Acres covered by above- - - - -	25,531
Pending agreements, prepared but not signed - - - - -	51
Acres covered by above- - - - -	20,323
Total agreements prepared, approved, and pending- - - - -	117
Acres covered by above- - - - -	45,854
District operated lands (2 farms) acres - - - - -	320
(a) 1938 fall grass seedings--acres- - - - -	70
(b) 1938 rye fall seedings--acres- - - - -	105
Approved agreements with District planted trees - - - - -	23
(a) Acres of such plantings- - - - -	59 $\frac{1}{4}$
(b) Number of trees to be planted on above - - - - -	30,354
Approved agreements with Forest Service plantings - - - - -	59
(a) Miles of 7 rod windbreak strips- - - - -	46.4
(b) Acres of above plantings - - - - -	646.65
Pending agreements with Forest Service Plantings- - - - -	51
(a) Miles of windbreak plantings proposed- - - - -	40.85
(b) Acres of above proposed plantings- - - - -	574.5
Total acres on above plantings- - - - -	1,221.15
Petitions for District Additions being circulated - - - - -	4
Acres covered by above- - - - -	20,480
Acreage added to District by agreements including contiguous lands outside original boundaries- - - - -	2,560

Other practices that will be put into effect for the first time in 1939 and which already have been approved by the Supervisors and the cooperating farmers include 146 acres of weed control, 5,194 acres of strip cropping, 8,979 acres of approved crop rotations, 10,724 rods of fencing, and 5,103 acres of controlled grazing.

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Corrugation Furrows in the Smoky Hill,
River Project

Corrugation furrows at Cheyenne Wells, Colorado are being constructed with an 8-foot road grader or terracer. The cutting blade of the machine is removed and three shovels, each 5 inches wide and 5 inches deep, are bolted to the blade proper, one shovel at each end of the blade and one in the center. Three furrows, each 5 inches wide and 5 inches deep, are made at one time. Extensions made of boiler plate, 2 feet in length, are fastened to each end of the blade

beyond the outside shovels. The furrowing machine is pulled by an ordinary farm tractor.

In operation, the blade is set so that it clears the surface of the ground by an inch. Dirt thrown out by the shovels is distributed evenly between furrows by the blade and extensions. Only 15 inches out of a possible 96 inches of sod are distributed and none of the sod is covered to the extent that the grass cannot come through.

Furrows of this type are not being constructed on sandy or highly dispersible shale soils as it is felt that they would be too short-lived to be effective. Such furrows on heavier soils have shown little silting at the end of the first season -- except where uncontrolled run-off from adjoining pastures or blow dirt from adjacent cultivated fields were hazards.

On slopes of 2 percent or less, corrugation furrows usually are constructed on half of the land in alternate strips. On steeper slopes, the pastures are furrowed solid at 4-foot intervals. Where the slopes are steep and the topography rolling with definite drainageways already formed, the furrows are used in conjunction with diversion structures.

Assuming that the furrows were spaced 4 feet apart and were of some nonporous material, it is found that one acre of land so treated would have a storage capacity in the furrow of 44,119 gallons of water. This storage capacity would be equal to the precipitation from a 0.51-inch rain without figuring any penetration between the furrows or allowing for any run-off.

At the end of the 1937 growing season when all vegetation was thoroughly cured, grass and weeds on all the plots were carefully clipped and weighed. The furrowed pasture produced 425.9 pounds of air-dry grass to the acre

while the untreated pasture produced only 212.9 pounds.

Watson, W. R., Soil Conservation, p. 65. Sept. 1938

Reprinted from The Ranger, October 20, 1938

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Careful Planning Needed For Successful Erosion Control

Careful planning is necessary if a successful erosion control-moisture conservation program is to be developed on any farm. This planning can be done at any time, but it should be worked out before regular plans are made for the coming planting season. Steps to be considered in planning a complete conservation program are:

1. Make an outline map of the farm, showing the size of the field.
2. Study the soil types and show each soil type in place on the outline map.
3. Determine the degree of slope on each field.
4. Make a survey to determine the amount of wind and water erosion that has taken place, and show this on the farm map.
5. Show on the map the 1938 acreage of each crop and of pastures.
6. Determine the conservation practice--such as strip cropping, contour tillage, and others--that should be used on each field. Assistance from the County Agent or the Soil Conservation Service, or from the AAA committee men, may be obtained to help with this determination.
7. Select the areas that are to be regrassed, and plan a complete crop rotation for the farm.

Extension Soils Schools Show Increased Popularity

Soils Schools for farmers are becoming increasingly popular in South Dakota. The Extension Service at State College has been holding these schools for the past several years, but this year added interest has been shown. A number of these schools have already been held and many more are planned before spring work begins. It is estimated that at least thirty counties will have held these schools before farm operations start this year.

These schools are scheduled by the county agent, who assists the Extension State office with the meetings. The schools are properly named, for each farmer who attends becomes a pupil, uses a small textbook, does some laboratory exercises, and takes an examination.

The first part of the course is taken up with a discussion of the composition and physical properties of the soil and the size of soil particles. The "pupils" are allowed to carry on a laboratory exercise to become acquainted with the relative size of soil particles, and the instructor carries on demonstrations that further illustrate this point.

After the pupils become acquainted with the soil separates, they are taught the methods of identifying the soil textures. The six most important soil classes are discussed, and then an identification examination is given.

Further discussion and demonstrations of the organic part of the soil, soil structure, humus, soil series, soil erosion, and erosion control practices are presented. A demonstration of the water absorbing ability of soil taken from a cultivated field as compared with that of soil taken from sod is also included, clearly illustrating what cultivation does to the soil.

To those who are not able to attend one of these schools, the Extension Service will be glad to mail the abbreviated textbook upon request.

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District Using Conservation Survey; Shows Need of Soil Analysis

Supervisors of Clearfield-Keyapha Soil Conservation District are making good use of the material and information gathered in the conservation survey. This survey mapped the present land use, the soil type, the slope, and the general erosion conditions. It was not in detail, but was made for the purpose of giving the Supervisors an opportunity to work out general recommendations for land use in the area. It has proved very valuable and has brought out the following pertinent facts:

1. Certain soils definitely are unfit for cultivation, regardless of the slope or degree of erosion.

2. Semi-hardpan and alkali spots are common over the District and would have to be watched carefully in making farm plans.

3. All soils in the District are subject to either wind or water erosion, or both, and this fact will have to be recognized when planning conservation practices.

4. All soils in the District are droughty and will not hold moisture for any considerable length of time; this fact will have to be taken into consideration in determining crops to plant and fields to contour.

5. Successful plantings will have to be limited to two soil types, Thurman and Gannett.

This information was most useful in making general District-wide plans. A more detailed survey of each individual unit to be signed up by the Supervisors will enable them to carefully plan each unit and each conservation practice, so that it will fit the soil type.

Area Office to Locate at Rapid City
Regional Office Moves to Lincoln

An area office through which well trained technicians will direct soil and moisture saving operations of the Soil Conservation Service in cooperation with western South Dakota land owners and operators is to be opened soon at Rapid City to facilitate handling of the expanded activities in the state.

Fifteen operating units, such as projects, camps and districts, will have the benefit of this localized technical assistance and of centralization of field business matters in the area office.

At the same time, moving of the Rapid City regional office to Lincoln, Nebraska for more effective coordination of this and other U. S. Department of Agriculture regional activities from a central point was decided upon, to be effective about March 1. The Farm Security Administration, Bureau of Agricultural Economics, Forest Service, and Bureau of Biological Survey are among bureaus already having their regional offices in Lincoln.

The Nebraska-Kansas-Oklahoma Soil Conservation Service region heretofore administered from Salina, Kansas is being eliminated as such, with Nebraska added to the Dakotas, Montana and Wyoming as the future Northern Great Plains Region, and the other two states attached to Southern Plains regions.

Under the new area organization, similar to that being developed in other states, the area offices are to be given greater responsibility for supervision of work units in the field, with the regional office function being predominantly that of administration, policy interpretation, direction of surveys and planning, reviewing and generally directing phases of the program. The extension of the area organization

to South Dakota was prompted by the present existence of more Soil Conservation Service activities in this state alone than there were in all four states of the region when the regional office was moved from Huron to Rapid City in March, 1936.

The State Coordinator's office is at Brookings, demonstration project offices are at Huron and Winner, Land Utilization project offices at Rapid City and Lemon (including a sub-office at Pierre), soil conservation district offices at Faith, Hecla, Chamberlain and Winner, and CCC camps at Alcester, Huron, Chamberlain and Fort Meade.

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Water Facilities Program to Include
Ten Additional Areas in South Dakota

The Water Facilities program in South Dakota will take on new impetus under a plan which has just been announced by the Soil Conservation Service, the Bureau of Agricultural Economics, and The Farm Security Administration. Under this new plan, the work will be carried on in ten additional areas. Up to the present time, the Crow Creek area in Brule, Buffalo, Jerauld, Hand and Hyde Counties, and the Sulphur Creek drainage in Meade, Butte and Perkins Counties have been the only work areas designated for operations.

The ten additional areas, which are called demonstration areas, have been approved so that the value of the work can be shown over a wider territory. The ten counties which have requested this demonstration work and which have been approved by the State Land Use Planning Committee are Hand, Walworth, Lyman, Perkins, Corson, Dewey, Ziebach, Meade, Haakon and Pennington. In each of these counties, the Land Use Planning Committee will approve applications, and the action agencies will work through the local County Agent in carrying on operations.

The type of work to be done includes the building of water facilities such as dams, wells, spreader ditches and small irrigation projects. Only four such demonstrations will be approved in any one county. Each individual who is selected to cooperate in this project will work out a complete conservation plan for his unit with the assistance of the Soil Conservation Service technicians. Money to assist in the construction of the facility may be borrowed from the Farm Security Administration.

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A. M. Eberle Reports on District Organization

A. M. Eberle, Director of Extension, returned from Washington the first part of February after spending a week working with the national offices of the Soil Conservation Service and the Extension Service.

He was called in to assist with the educational activities procedures to be recommended in connection with the soil conservation districts that are organizing rapidly over the entire country.

Upon his return, Mr. Eberle reported that there were 109 districts in the United States, comprising 59,039,973 acres, for which a certificate of organization had been issued. There were 62 districts which had signed memoranda of understanding with the Department of Agriculture and are receiving technical assistance. Forty-three of these districts have the use of Soil Conservation Service equipment, and 33 are using CCC labor, equipment, and materials.

The place of the Extension Service in organizing soil conservation districts was the main theme of the Washington conference. The Extension Service has the responsibility of carrying on the educational activities in these areas, explaining the functions of a district,

assisting with the operations, and of working closely with the Supervisors and the cooperating agencies. The close tie-up between the Supervisors and the County Agents is very apparent in South Dakota, where the County Agent acts as the Secretary to the Board of Supervisors in each of the five districts now operating in this state.

PROF. J. G. HUTTON SAYS:

(Note: Following are several pointed paragraphs selected from a speech given by Professor J. G. Hutton, South Dakota State College, on "Drought, Dust, and Destitution" at Farm and Home Week, November, 1937.)

"I have sometimes said, and I think I am still willing to say, that if the Dakota rotation--corn or sorghum, small grain, and legume crops like sweet clover --- had been practiced regularly on the farms of the state so that we would have had of the tillable land 1/3 in an intertilled crop like corn or cane or potatoes, another 1/3 in legume crop mixed with grasses, no expensive agricultural program would have been necessary; and much of the expense of the erosion control would have been avoided; and much of the financial distress due to crop failures and drifting soils resulting in the loss of farms and homes and general depression would have been avoided. What do you think?"

* * * * *

"Where water does not enter the soil readily it runs away over the surface. Running water has power to do work. Running water turns great hydro-electric machines which produce thousands of horsepower of electricity. Running water cuts the soil and carries the soil away, and in the United States millions of acres of land have been denuded of their productive top-soil and are now barren of vegetation, and have been abandoned as human habitation."

"The reduced amount of water in the soil, because of the reduced ability of the soil to absorb water or to hold it, results in a smaller growth of vegetation so that the soil is readily blown or washed away. You see this is a vicious circle which keeps right on destroying soil and preventing growth of vegetation which would protect it."

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"We don't know so very much about the soils of South Dakota as yet. I have been here going on 27 years, and only during eight years of that time was there any opportunity to make any study of the soils of the state, and then only part time ----- over the years the amount of time that could be spent on soils research, that is soil study, with just one man for part time for the last 27 years, over 77,000 square miles of land in South Dakota. What we need is detailed information concerning these soil types and to know what is going on within the soil. There are a great many recommendations and suggestions being made to improve the soil, and many of them are being made without very much knowledge about the soil.

"We hear a great deal about letting the land go back to grass. Well, that's an easy thing to say, but to get grass to grow again on land where it once grew under natural conditions is not so easy as most men can tell you who have attempted to do it. Some of you may know how difficult it is to get grass to grow on a lawn, even where you can control the conditions. There is no doubt that much land which has been plowed should be returned to grass as speedily as possible, but to do this quickly we must have more knowledge about the relation of soils to grass than we have at the present time. It is entirely possible that the loss of money in attempting to restore vegetation of this sort would be far greater than the cost of finding out information upon which such a program could be successfully based."

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Cover And Tillage For Soil Conservation

Wind and water erosion are caused by the same set of circumstances and are controlled by largely the same methods with different application. For example, as water moves down a hillside, it attains sufficient velocity to carry soil particles. If there is no protection from this action of the water, it may carry considerable amounts of soil from the hillside and deposit it at some lower elevation,

Wind erosion is caused by a similar action. There is a belt of atmosphere around the earth in which disturbances occur from time to time and cause the air to flow over the surface of the soil in much the same way as water runs down the side of a hill. However, the air is lighter than water, making it necessary for it to attain a much greater speed before it moves the soil.

When man entered this territory, there was a grass cover over virtually the entire area, and those who have lived here longest will testify that very little erosion was noticed in those days. When the surface of the ground is covered with a good sod of grass or similar vegetation, it prevents erosion. If water is running down a moderate slope covered with grass, the part of the water in contact with the soil necessarily is slowed down to a harmless speed. That is, water can move but a short distance until it runs into a grass growth and has to change its direction. In so doing it meets water that is turning out for some other grass blade. In this process, water which is in contact with the ground is slowed down until it is moving, so that it forms a film. Then the other run-off water slides over the top of this film of water next to the ground and the soil itself is not disturbed. In the same way, where wind is the erosive force on a grass covered soil, the air does not move at an

erosive velocity right at the surface of the soil.

Not only does the cover help to prevent erosion, but the humus formed from the decaying vegetable matter acts as a "glue" to hold particles of soil together in small granules. A soil in its native stage, with an abundance of humus, is very granular, with the soil particles of comparatively large size. If this humus is taken out, these little granules break down into smaller particles, making the soil more susceptible to erosion, because the larger soil particles are more difficult for the wind and water to move. The fibrous root system of grass plants has a tendency to hold the particles together by mechanical force.

On land that has been farmed for several years, the original cover has been removed. Through years of cropping, much of this humus or cementing substance has been mined out and the grass roots have disappeared.

For example, a field that has just been plowed and put in shape for a spring crop will have no vegetative cover on it, if the farmer is a "good farmer". The soil will be smooth, and the particles will be broken up as much as possible to form a desirable seedbed. If this field has been farmed for several years, it will not contain enough grass roots to hold the soil in place. The factors that prevented erosion when the land was in the natural state have been removed to a large extent. The cover is entirely gone; part of the humus or cementing substance is gone, and tillage has broken down the original granular structure, leaving the field in an erodible condition.

Either wind or water can move soil left in this condition much easier than it can soil in the original protected state. The problem, then, is to keep raising crops and still not allow the soil to be eroded away.

The logical procedure is to try to establish conditions on the land as nearly like the original conditions as possible, and still take crops from it. This is done, first, by keeping cover on the soil as much of the time as possible, and not exposing large fields to the action of wind or water at any one time.

Second, the humus supply is built up by plowing under green manure and other crop residues, to restore the cementing substance for improving the granular structure and to improve the soil fertility. Third, roots are put into the soil through long-time rotations with grass species which have extensive root systems that hold the soil in place. A long-time grass rotation is one in which grass is seeded on part of the cultivated land and left several years, after which that land is returned to cultivation and a new area is seeded to grass, so that in fifteen or twenty years the whole farm area will have been in grass for a period of years.

Tillage practices should be such that they will help, first, to maintain a cover on the soil; second, aid in conserving the humus supply or at least in keeping the granular structure of the soil from being broken up; and third, conserve the grass roots.

Past tillage practices too often have been about as follows:

1. The field is plowed with the ordinary moldboard plow, which is a very effective pulverizing machine.
2. It is dragged with a spike-tooth harrow, probably twice.
3. The corn is cultivated from three to five times, making about six tillage operations for this one crop.

Each operation helps to break down the granular structure of the soil and reduce it to a more erodible condition. As the humus becomes exhausted, this tillage process is more effective in

breaking down the soil structure than when the humus was plentiful.

The next year, this field probably would be disked once or twice, then drilled to small grain, and then dragged again once or twice. The additional tillage would put the soil in that much more erodible condition.

In order for implements to help in erosion control, tillage operation must be reduced and implements used that will work the land sufficiently for good crop yields and yet not pulverize the soil or remove all the cover. Implements have been devised that leave the ground ridged or pocketed so as to aid the cover in reducing the velocity of the water or wind as it moves over the soil surface. Such machines may be used for temporarily roughening land that has been denuded by erosion to protect it until it is back under cover. Implements that are used for this work include:

1. Basin lister (regular corn planting type), seeders or drills with damming attachments.
2. Deep-furrow drills, disk type and shovel, or lister type.
3. Field cultivator.

Measures for controlling wind erosion and water erosion are essentially the same. In a wind erosion area, the plan is to farm in alternate strips of cultivated crop and drilled crop, with these strips running crosswise to the direction of the prevailing winds.

The small grain strips act as buffers for intervening non-crop or clean-tilled strips in the fall or spring when the latter are mostly bare. Again this stubble may serve as a protection for small grain when it is becoming established the following spring. Any rough tillage along the length of these strips also forms small barriers for the erosive wind.

In water erosion areas, virtually the same plan is used, except that the strips are crosswise to the flow of water instead of crosswise to the wind. This is contour farming, across the level of the slope.

The following example will illustrate how tillage for erosion control may be worked out.

For corn:

1. Loosen the soil and ridge it, leaving the stubble on top, with one operation of the field cultivator.
2. Basin list it into corn the following spring.
3. Give two cultivations during the growing season.

This set of operations will have much less pulverizing effect on the soil, and also will be much less expensive than the plowing-harrowing-dragging method. For small grain, one operation with a deep-furrow drill possibly may be all that is necessary; but for weed control, once over with a duck-foot before drilling may be necessary and probably will be sufficient.

It costs little for machines that will do most of these operations. For example, an ordinary single disk grain drill with every other disk removed will give satisfactory results comparable to those of a disk type deep-furrow drill. Similarly, an ordinary moldboard plow with moldboards removed will do work comparable to that of the field cultivator. South Dakota State College has devised an attachment for an ordinary corn cultivator by which it can be transformed into a field cultivator.

- Lee W. Minium
Ass't. Agr. Engineer

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UNITED STATES
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B63
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Ross D. Davies, State Coordinator
Brookings, South Dakota

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